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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/628,828	07/31/2000	Luca Rigazio	9432-000116	5141

7590 06/07/2005

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EXAMINER	
HAN, QI	
ART UNIT	**PAPER NUMBER**
2654	

DATE MAILED: 06/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/628,828	RIGAZIO ET AL.	
	Examiner	Art Unit	
	Qi Han	2654	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 November 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 6-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 6-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 November 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Response to Amendment

2. This communication is responsive to the applicant's amendment dated 11/24/2004. Applicant amended claims 1 and 10, specification and Figs. 2, 4a and 4b, and cancelled claim 20.

3. The examiner contacted, the applicant's representatives, Gregory A. Stobbs and Jennifer S. Brooks, and one of the inventors, Patrick Nguyen (authorized by the applicant's representatives), regarding the problem of amended drawing and related disclosure, through telephone calls on 5/18-20/2005, for better understanding the claimed invention.

Response to Arguments

3. Applicant's arguments filed on 11/24/2004 with respect to rejection of claims 1-4 and 6-19 under 35 USC 103, have been fully considered but are moot in view of the new ground(s) of rejection, since the arguments are based on the amended claims that introduce new issue(s) (see detail in the claim rejection below).

Specification and Drawing

4. The disclosure is objected to because of the following:

a. Regarding the amended Fig. 4a (dated 11/24/2004), the upper portion of the drawing shows a graph structure, which does not disclosed in the specification and is inconsistent with the tree structure of the lower portion of the drawing. Appropriate correction is required.

b. Regarding the amended Fig. 4b (dated 11/24/2004), the node numbers in the series of brackets are incorrect, starting from [2]. Further, the variable symbol "K" appears to be "K" or K. Appropriate correction is required.

c. Regarding amended Fig. 2, it appears that the lexical tree 30 is inconsistent with other trees in Figs. 4a, 4.b that are supposed to be derived from the tree 30. For example, the nodes of k and h in the tree 30 are in different generations even though they positioned in the same row, while the two nodes in the tree structure of Figs. 4a and 4b are in the same generation, which causes confusion of how to define the term "generation". Further, the related disclosure in the specification (see page 10, lines 5-6) says that "this flag is set to identify that if that node represents the last child of its parent", which suggests that if node h is identified as last child as disclosed, the node aa should be positioned before (at top of) node h in the left side linked list 32, because, by definition, the node k in the tree has two children nodes, aa and h. Appropriate correction/clarification in either the drawing or the specification is required.

5. The examiner provides two copies of drawings with possible or suggested corrections for Figs 4a and 4b, see the attachment of this office action (two pages).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, the amended claim added new limitation "said traversal algorithm includes ...nodes that are traversed using a forward recursion..." (amendment: page 6, lines 11-13 of claim 1) is in conflict with the other limitation "said algorithm traversing said nodes ...the deepest child generation is processed first" (line 10 of claim 1) and in conflict with the disclosure "traversal starts at the active node of greatest depth..." in the specification (page 14, lines 4-5), which suggests a backward process. Thus, the claimed limitation lacks clear definition and scope, as being indefinite.

In addition, it is noted that since the claim recites an improvement in a dynamic program system (interpreted as apparatus) including structural elements (see paragraphs 1 and 3) and a traversal algorithm (interpreted as a process/method, see paragraph 2), as best understood, the claim is treated as a product-by-process claim. Thus, the new added limitation that only amended the limitation of the algorithm (method) may not be given a contribution for determining patentability, because "determination of patentability is based on the product itself" and "does not depend on its method of production" (see MPEP 2113).

Regarding claim 10, the rejection is based on the same reason described for claim 1, because the claim recite the same or similar limitation(s) as claim 1.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 1 and 10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding claims 1 and 10, since the amended claim limitation "said traversal algorithm includes ...nodes that are traversed using a forward recursion..." (amendment: page 6, lines 11-13 of claim 1) is in conflict with the other limitation "said algorithm traversing said nodes ...the deepest child generation is processed first" (line 10 of claim 1) and in conflict with the disclosure "traversal starts at the active node of greatest depth..." in the specification (page 14, lines 4-5) that suggest a backward process, the claimed introduces an enablement problem. Further, the amended claim include a new added limitation "thereby computing the scores based only on knowledge of child nodes", which logically leads to all results of the scores based only on the leaf nodes and ignores all the contribution of intermediate nodes for computing the scores. It doesn't make sense to do so because the scores without contribution of intermediate nodes would be unusable and incorrect for speech recognition. Therefore, the claimed subject matter cannot enable one skilled in the art to make and/or use the claimed invention, without undue experimentation.

Claim Rejections - 35 USC § 103

8. Claims 1, 3, 6 -16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kao (US 6,374,222 B1), in view of Mitchell et al. (US 6,574,595), hereinafter referenced as Mitchell.

As per **claim 1**, as best understood in view of the objection and the claim rejection under 35 USC 112 1st and 2nd (see above), Kao discloses method of memory management in speech recognition (title), for reducing the size of memory required in speech recognition searching (abstract), comprising:

"a tree data structure implemented in a computer-readable memory accessible by a processor, said tree data structure having a plurality of nodes that topologically define a root node and a plurality of parent-child generations, including a deepest child generation that is topologically furthest from the root" (column 3, lines 2-5 and Fig. 1, 'computer/comparator 10b' and 'memory10c'; column 6, line 37, 'digital signal processor'; column 2, line 40 and column 8, line 9, 'search tree' including node, see Fig. 5);

"a traversal algorithm implemented by said processor, said algorithm traversing said nodes based on a set of traversal rules", (column 6, lines 37-38, 'digital signal processor implementation'; column 4, lines 1-67 and column 9, lines 10-45, 'a structure called slot (herein equivalent to node)' and 'search algorithm', including the fields of indexes and pointers and the algorithm related requirement, grammar, timing and condition (interpreted as a set of traversal rules); and column 5, lines 61-67 and Fig.4, 'traverse down the search space'),

> "whereby nodes of a given generation are processed before the parent nodes of said given generation are processed" and "traversal among nodes of each generation

proceeds in the same topological direction, …using a forward recursion…" (column 4, lines 58-60, 'propagate the current time stamp backward through the whole path (a path is a backward linked list of slots)', and Fig. 3 and Fig. 5 shows the tree having multiple levels (column, which is equivalent to generation), each level having multiple nodes, and each nodes having child nodes except leaf nodes, so that a child generation is processed before its parent node with a backward direction (interpreted as topological direction), column 5, lines 61-62 and Fig. 4, 'traverse down the search space (interpreted as a forward recursion)');

"a mechanism for designating selected ones of said nodes as active nodes, wherein said active nodes have a probability score above a pre-determined search threshold, (column 4, lines 64-67, 'active state (herein equivalent to active node)'; column 3, lines 9-11, 'HMM' with 'states and transitions'; and column 5, lines 64-65, 'the acoustic score and the transition score are accumulated'; which suggests using probability score).

But, Kao does not expressly disclose that "the deepest child generation is processed first", the probability score stated above is "above a pre-determined search threshold" and is "determined from information sourced only from the child generation nodes, wherein said traversal algorithm only traverses said active nodes" and "said traversal algorithm includes a dynamic programming process". However, these features are well know in the art as evidenced by Mitchell, who discloses 'a beam search algorithm' (herein equivalently interpreted as to traversal algorithm) with a linked list known as the decoding tree (column 3, line 52 to column 4 line 6); 'the list of "viable" phoneme sequences is updated and stored as a linked list also known as the decoding tree' in which 'each node' 'corresponds with a particular active phoneme of the

phone network' (column 4, lines 2-6); 'at end of the spoken utterance (herein corresponding to the deepest child generation in the process), the best scoring ending phoneme is used to retrieve the most likely phoneme sequence by traversing through the list of corresponding pointer entries in the decoding tree and this process is commonly referred to as backtracking' (column 4, lines 6-11); 'under the constraints (herein interpreted as a set of rules) of this pre-specified phoneme network', including removing those phonemes that 'likelihood score lower than a prescribed value (a pre-determined search threshold)'(column 3, lines 44-65); and 'performing dynamic programming process' (column 2, lines 14-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kao by specifically providing dynamic programming process and search algorithm for traversing only active nodes (active states) of the tree structure, using probability score based on the child generation nodes for the active nodes and using a pre-determined threshold for searching, as taught by Mitchell, for the purpose of reducing search complexity (Mitchell: column 3, lines 53-54) for a speech recognition system.

As per **claim 3** (depending claim 1), Kao in view of Mitchell further teaches that "said tree data structure is encoded in said memory with parent-child generations being represented through linked list", (Kao: column 2, line 4 and column 4, line 60; and column 4, lines 12-24, 'slot (node)' 'structure', also see Fig. 5).

As per **claim 6** (depending claim 1), Kao in view of Mitchell further disclose "designating selected ones of said nodes as active nodes comprises an active envelope data structure associated with said tree data structure" (Kao: column 4, lines 7-20 and column 9, lines 10-18), 'a slot (node) structure for the search network'; Mitchell: column 4, lines 2-6, 'the list of

"viable" phoneme sequences is updated and stored as a linked list (herein interpreted as active envelope data structure) also known as the decoding tree', 'each node... corresponds with a particular active phoneme of the phone network').

As per **claim 7** (depending claim 1), Kao in view of Mitchell further discloses "designating selected ones of said nodes as active nodes' (Kao: column 3, lines 55-59, 'lexicon HMM' and 'active state (herein equivalent to active node)'); and "wherein said traversal algorithm includes a traversal rules whereby only said active nodes are traversed", (Mitchell: column 3, lines 52-53, 'a beam search algorithm (herein equivalently interpreted as to traversal algorithm) only searches the active portion of the phone network'; column 4, lines 2-6, 'the list of "viable" phoneme sequences is updated and stored as a linked list also known as the decoding tree, in which each node corresponds with a particular active phoneme of the phone network').

As per **claim 8** (depending claim 1), Kao in view of Mitchell further discloses "said tree data structure is a lexical tree representing a lexicon", (column 2, lines 1-26, 'lexical tree', 'pronunciation grammar'; and column 3, lines 55-59 'lexicon HMM').

As per **claim 9** (depending claim 1), Kao in view of Mitchell further discloses "said tree data structure is a lexical tree representing the lexicon of a speech recognizer" (column 2, lines 1-26, 'lexical tree', 'pronunciation grammar'; and column 3, lines 32-59, 'a speech recognition system (equivalent to speech recognizer)', 'lexicon HMM').

As per **claim 10**, as best understood in view of objection (see above), Kao discloses 'method of memory management in speech recognition' (title), for reducing the size of memory required in speech recognition searching (abstract), comprising:

"a tree data structure implemented in a computer-readable memory accessible by a processor, said tree data structure having plurality of nodes, including a root node, child generation nodes and parent generation nodes" (column 3, lines 2-5 and Fig. 1, 'computer (inherent include processor)/comparator 10b' and 'memory10c'; column 2, line 40 and column 8, line 9, 'search tree', 'node' and 'slot', also see Fig. 5);

"a mechanism for designating selected ones of said nodes as active nodes, said mechanism for designating selected ones of said nodes as active nodes defines an active envelope and uses a set of rule to propagate the active envelope", (column 1, line 47 'Viterbi beam search' and column 7, line 40, 'the search beam width'; column 4, lines 10-20 and 55-69, 'active state (herein equivalent to active node)', 'many states can be active and need to be evaluated, they are linked together by next_state (pointer)' herein the linked active states is interpreted as active envelope, 'propagate the current time stamp backward through the whole path'); and

"a traversal algorithm implemented by said processor, said algorithm traversing said nodes based on a set of traversal rules" and "using a forward recursion..." (column 6, lines 37-38, 'Digital Signal Processor implementation'; column 5, lines 61-67 and Fig.4, 'traverse down the search space'; column 4, lines 1-67, 'defining the computer data structure and implementing the algorithm', 'search algorithm', column 5, lines 61-62 and Fig. 4, 'traverse down the search space (interpreted as a forward recursion)').

But, Kao does not expressly disclose that during the traversal algorithm, the probability score stated above is "above a pre-determined search threshold" and is "determined from information sourced only from the child generation nodes, wherein said traversal algorithm only

traverses said active nodes" and "said traversal algorithm includes a dynamic programming process". However, this feature was well know in the art as evidenced by Mitchell, who discloses a beam search algorithm (herein equivalently interpreted as to traversal algorithm) with a linked list known as the decoding tree (column 3, line 52 to column 4 line 6); the list of "viable" phoneme sequences is updated and stored as a linked list also known as the decoding tree, in which each node corresponds with a particular active phoneme of the phone network (column 4, lines 2-6); at end of the spoken utterance (herein corresponding to the deepest child generation in the process), the best scoring ending phoneme is used to retrieve the most likely phoneme sequence by traversing through the list of corresponding pointer entries in the decoding tree and this process is commonly referred to as backtracking (column 4, lines 6-11); 'under the constraints (herein interpreted as a set of rules)', including removing those phonemes that 'likelihood score lower than a prescribed value (a pre-determined search threshold)' (column 3, lines 44-65); and 'performing dynamic programming process' (column 2, lines 14-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kao by specifically providing dynamic programming process and search algorithm for traversing only active nodes (active states) of the tree structure, using probability score based on the child generation nodes for the active nodes and using a pre-determined threshold for searching, as taught by Mitchell, for the purpose of reducing search complexity (Mitchell: column 3, lines 53-54) for a speech recognition system.

As per **claim 11** (depending claim 10), Kao in view of Mitchell further defines a slot (node) structure for the search network (Kao: column 4, lines 7-20 and column 9, lines 10-18), and the list of "viable" phoneme sequences is updated and stored as a linked list (herein

interpreted as active envelope data structure) also known as the decoding tree, in which each node corresponds with a particular active phoneme of the phone network (Mitchell: column 4, lines 2-6), which corresponds to the claimed "said mechanism for designating selected ones of said nodes as active nodes comprises an active envelope data structure associated with said tree data structure."

As per **claim 12** (depending claim 10), Kao in view of Mitchell further discloses that "said traversal algorithm includes a dynamic programming process that assigns a likelihood score to nodes that are traversed" (Mitchell: column 3, lines 41-53, 'highest likelihood score' and 'dynamic programming using Viterbi algorithm').

As per **claim 13** (depending claim 12), Kao in view of Mitchell further discloses "designating selected ones of said nodes uses said likelihood score to designate said active nodes" (Mitchell: column 2, lines 12-24, 'computing likelihood score for all active sub-word (herein equivalent to active node) models'; column 2, lines 12-24, 'there is change in the local best path which is based on the cumulative likelihood score of the phoneme sequence').

As per **claim 14** (depending claim 10), Kao in view of Mitchell further discloses the beam search algorithm (herein equivalently interpreted as traversal algorithm) for active portion of the phone network, including activating all valid phonemes, dynamic programming by using Viterbi algorithm, pruning unlikely phoneme sequences that have a lower cumulative likelihood score than a prescribed value (predetermined thresholds) (Mitchell: column 3, lines 52-65), which corresponds to the claimed "said traversal algorithm includes a dynamic programming process that assigns a likelihood score to nodes that are traversed and wherein nodes are designated as active nodes if their likelihood score is above a predetermined threshold."

As per **claim 15** (depending claim 14), Kao in view of Mitchell further teaches that "said predetermined threshold is calculated based on the highest likelihood score", (Mitchell: column 3, lines 62-54, 'a prescribed value relative to the current best cumulative score (interpreted as highest likelihood score)').

As per **claim 16** (depending claim 10), Kao in view of Mitchell discloses a slot (node) structure for the search network (Kao: column 4, lines 7-20 and column 9, lines 10-18) that is capable of evaluating and linking active states (Kao: column 5, lines 1-7); an example of the expansion (herein interpreted as propagate) from phone to next phone (Kao: column 5, lines 11-19 and Fig. 4); and the list of "viable" phoneme sequences is updated and stored as a linked list (herein interpreted as active envelope) also known as the decoding tree, in which each node corresponds with a particular active phoneme of the phone network (Mitchell: column 4, lines 2-6) and the beam searching algorithm under the constraints (herein interpreted as a set of rules, including removing those phonemes that likelihood score lower than a prescribed value (Mitchell: column 3, lines 44-65); which corresponds to the claimed "said a mechanism for designating selected ones of said nodes as active nodes defines an active envelope and uses a set of rules to propagate the active envelope by removing nodes that have a likelihood score below a predetermined threshold."

As per **claim 18** (depending claim 14), Kao and Mitchell further discloses dynamic memory for building a searching tree by using RAM (Kao: column 1, lines 23-25); a slot (node) structure for the search network with fields of indexes and pointers (herein interpreted topological index, and inherently can be used for sorting), and execution requirements including grammar, timing and condition (herein interpreted as a set of rules) (Kao: column 4, lines 7-67

and column 9, lines 10-45), which suggests that the combined system is capable of implementing the functionality as claimed "said set of rules for inserting nodes guarantees that the nodes in said active envelope are sorted by their topological index."

9. Claims 2, 4 and 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kao in view of Mitchell and further in view of well known prior art (MPEP 2144.03).

As per **claim 2** (depending claim 1), even though Kao disclose "said tree data structure is encoded in said memory" (Kao: Fig. 1 and column 2, lines 39-42), Kao in view of Mitchell does not expressly disclose the memory as a flat representation in which nodes of each generation occupy contiguous memory locations". However, an official notice is taken that the feature of was well known in the art, because flat (block) memory presentation is one of the commonly used tree structure implementations, and breadth-first search is one of the commonly used search (or traversal) algorithms. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kao in view of Mitchell by providing commonly used block presentation for memory arrangement and breadth-first search (traversal) algorithm, so as to store nodes of each generation in contiguous memory location, for the purpose of increasing processing efficiency.

As per **claim 4** (depending claim 1), Kao in view of Mitchell further discloses a slot (node) using C (language) structure that has fields of indexes and pointers (Kao: column 4, lines 12-24), which are used for linking its parent and/or child, and also inherently used for indicia, such as slot_pointer = null or index_integer = 0 stands for a boundary, which corresponds to the claimed "the nodes ... have indicia designating the topological boundary between children of the

same parent". But Kao in view of Mitchell fails to expressly disclose that the "said tree data structure is encoded in said memory as a flat representation in which nodes of each generation occupy contiguous memory locations". However, the examiner takes official notice that this feature was well known in the art, because conventional breadth-first traversal algorithm is generally used for storing nodes of each generation in contiguous memory location.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kao in view of Mitchell by specifically providing a memory arrangement same as or similar to that of the conventional breadth-first traversal algorithm, for the purpose of increasing processing efficiency.

As per **claim 17** (depending claim 10), Kao in view of Mitchell further discloses "said a mechanism for designating selected ones of said nodes as active nodes defines an active envelope and uses a set of rules to propagate the active envelope" and the "nodes that *nodes* that have a likelihood score above a predetermined threshold", (Kao: column 4, lines 7-20 and column 9, lines 10-18, a slot (node) structure for the search network; column 5, lines 1-7, 'evaluating...slots of active states (active nodes)...linked by next_state (form active envelop); column 5, lines 11-19 and Fig. 4, 'the expansion (interpreted as propagate)' from phone to next phone; and Mitchell: column 4, lines 2-6, 'the list of "viable" phoneme sequences is updated and stored as a linked list (interpreted as active envelope) also known as the decoding tree', 'each node corresponds with a particular active phoneme of the phone network'; Mitchell: column 3, lines 44-65, 'the beam searching algorithm under the constraints (a set of rules)', 'phoneme sequences (corresponding nodes)' that 'likelihood score lower than a prescribed value (a pre-determined threshold) ... are pruned (keep those nodes above the value)'). But, Kao in view of

Mitchell fails to expressly disclose that the "mechanism uses a set of rules to propagate the active envelope by **inserting nodes**". However, an official notice is taken that this feature was well known in the art, because inserting nodes on a linked list based structure is widely used in data structure design in computer applications, thus Kao in view of Mitchell is capable of inserting node in a link list (Kao: column 6, lines 1-2, 'add at least one slot (node) to the search path, and Mitchell: column 3, lines 44-65, 'phoneme ... are removed'), without any difficulty.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kao in view of Mitchell by specifically providing a mechanism for inserting nodes in an active node link list, for the purpose of implementing an alternative way for a link list in a search algorithm.

As per **claim 19** (depending claim 10), Kao in view of Mitchell dose not expressly disclose that the "said processor employs a cache and wherein said tree data structure is encoded in said memory such that traversal of said tree proceeds into said cache". However, the examiner takes official notice that this feature was well known in the art, since caching technique for both hardware structure and software arrangement was widely used in signal processing art and computer related art. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kao in view of Mitchell by specifically providing caching technique in computer applications for traversal using tree data structure, for the purpose of reducing processing time.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Please address mail to be delivered by the United States Postal Service (USPS) as follows:

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Or: (703) 872-9306, (for informal or draft communications, and please label "PROPOSED" or "DRAFT")

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Effective January 14, 2005, except correspondence for Maintenance Fee payments, Deposit Account Replenishments (see 1.25(c)(4)), and Licensing and Review (see 37 CFR 5.1(c) and 5.2(c)), please address correspondence to be delivered by other delivery services (Federal Express (Fed Ex), UPS, DHL, Laser, Action, Purolater, etc.) as follows:

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Alexandria , VA 22314

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Qi Han whose telephone numbers is (571) 272-7604. The examiner can normally be reached on Monday through Thursday from 9:00 a.m. to 7:00 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil, can be reached on (571) 272-7602.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Inquiries regarding the status of submissions relating to an application or questions on the Private PAIR system should be directed to the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 703-305-3028 between the hours of 6 a.m. and midnight Monday through Friday EST, or by e-mail at: ebc@uspto.gov. For general information about the PAIR system, see http://pair-direct.uspto.gov.

QH/qh
May 19, 2005

David D. Knepper

DAVID D. KNEPPER
PRIMARY EXAMINER

1/2 attachment for 09628828

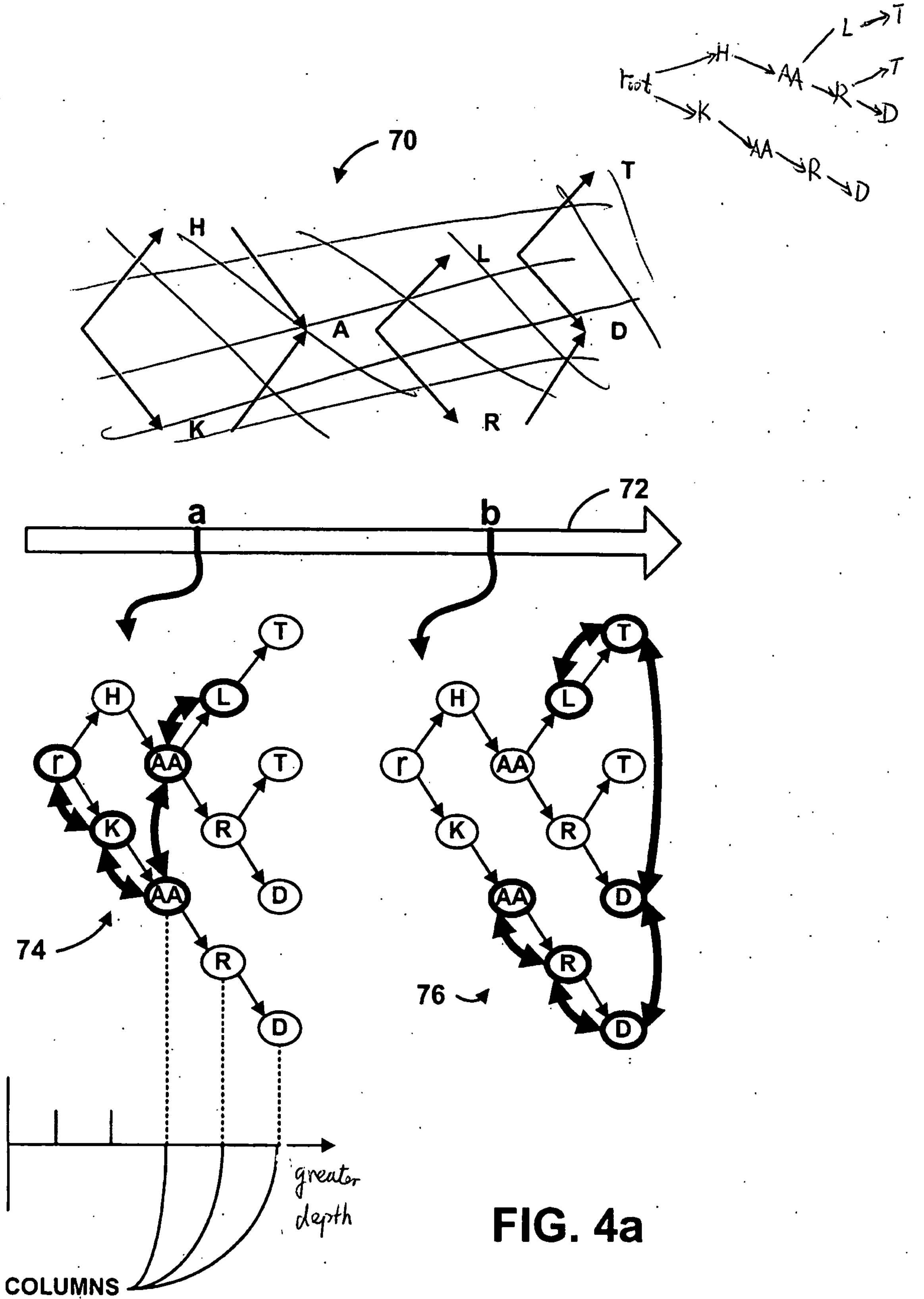

FIG. 4a

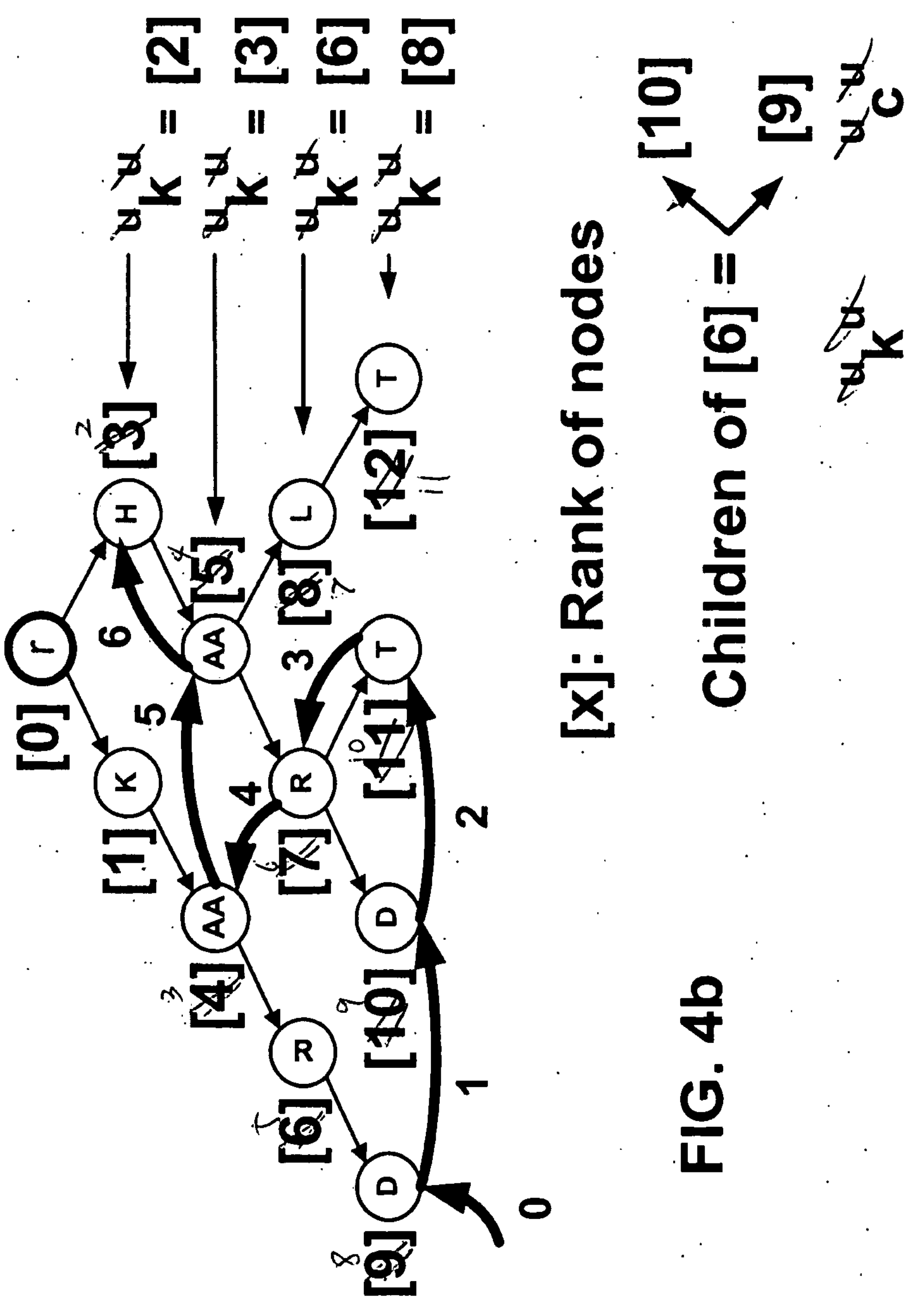

FIG. 4b